Economic impact of pandemic influenza in the U.S.: Implications for setting priorities

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Additional Information

- End of lecture get information on:
- Additional data sources
- How to obtain free software to aid public health officials plan and prepare for next ‘flu pandemic

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The modeling problem

- Influenza pandemics in 20th Century
  - 1918, 1957, 1968
  - Massive and notable impacts
- Experts predict another pandemic
  - cannot reliably predict when
  - cannot reliably predict how, who, where
- Plan for next pandemic
  - need numbers

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Objectives

- Estimate number of health outcomes
- $ estimate of health outcomes
- NPV of possible vaccination interventions
- Different criteria to set priorities
- "Insurance premiums" for the 3 P's
- Economics of various vaccine distributions

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The model

- Monte Carlo simulation, outcome rates (x4)
- 3 age groups - 0-19 yrs, 20-64 yrs, 65+ yrs
  - 2 age distributions of cases
- Two risk groups - "high risk" & "non"
- Societal perspective
- Gross attack rates: 15% - 35%, by %5

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Data sources

- Outcome rates - variety of sources (epidemics)
  - problem: differing denominators
  - problem: different attack rates
  - solution: "convert" to rates per 1,000 sick
- Cost of health outcomes - Medstat, others
- Cost of vaccination - $21 or $62 per person

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Some health outcome rates

Deaths	Rates per 1,000 population		
	Lower	"Most likely"	Upper
Non-high risk			
0-19 yrs	0.014	0.024	0.125
20-64 yrs	0.025	0.037	0.09
65 + yrs	0.28	0.42	0.54
High risk			
0-19 yrs	0.126	0.22	7.65
20-64 yrs	0.1		5.72
65 + yrs	2.76		5.63

Hospitalization costs ($ 1995)

	Age group		
Variable	**0-19 yrs**	**20-64 yrs**	**65+ yrs**
Hospital*	**$2,936 ± 2,099**	**$6,016 ± 2,086**	**$6,856 ±3,200**
Outpatient	**$74**	**$94**	**$102**
Co-pay	**$5**	**$5**	**$5**
Drugs	**$26**	**$42**	**$41**
Days lost	**5 ± 3**	**8 ± 5**	**10 ± 5**
Total ($)	**3,366**	**6,842**	**7,653**

*** Hospital costs adjusted using 0.53 cost-to-charge ratio**

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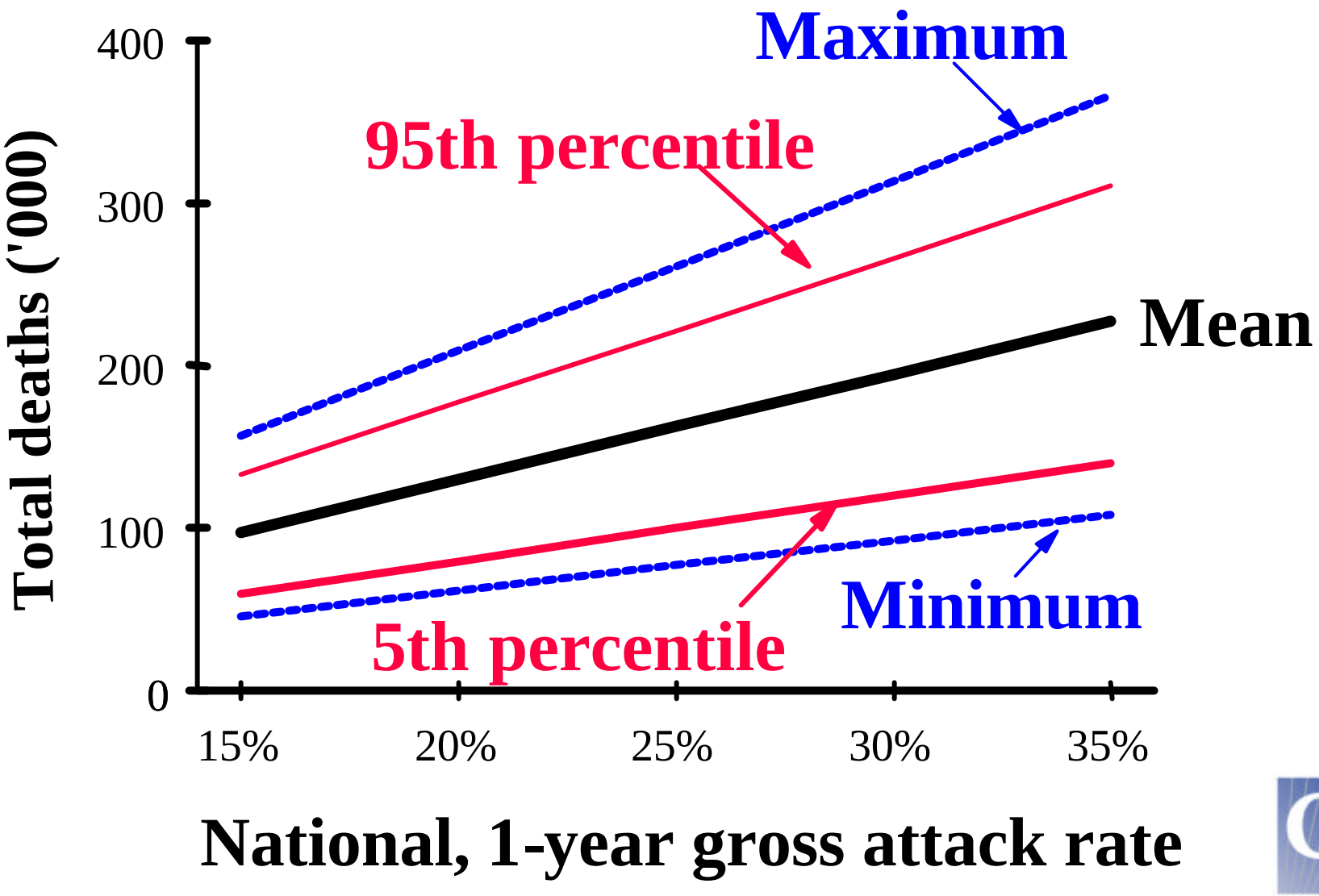
Estimated deaths due to 'flu pandemic (U.S.)



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% distribution of death by age & risk group

	Mean	% High risk
0-19 yrs	19.2	8.2
20-64 yrs	43.6	37.5
65 + yrs	37.2	31.1
Total	100.0	76.8

High risk = 15% - 25% of U.S. population

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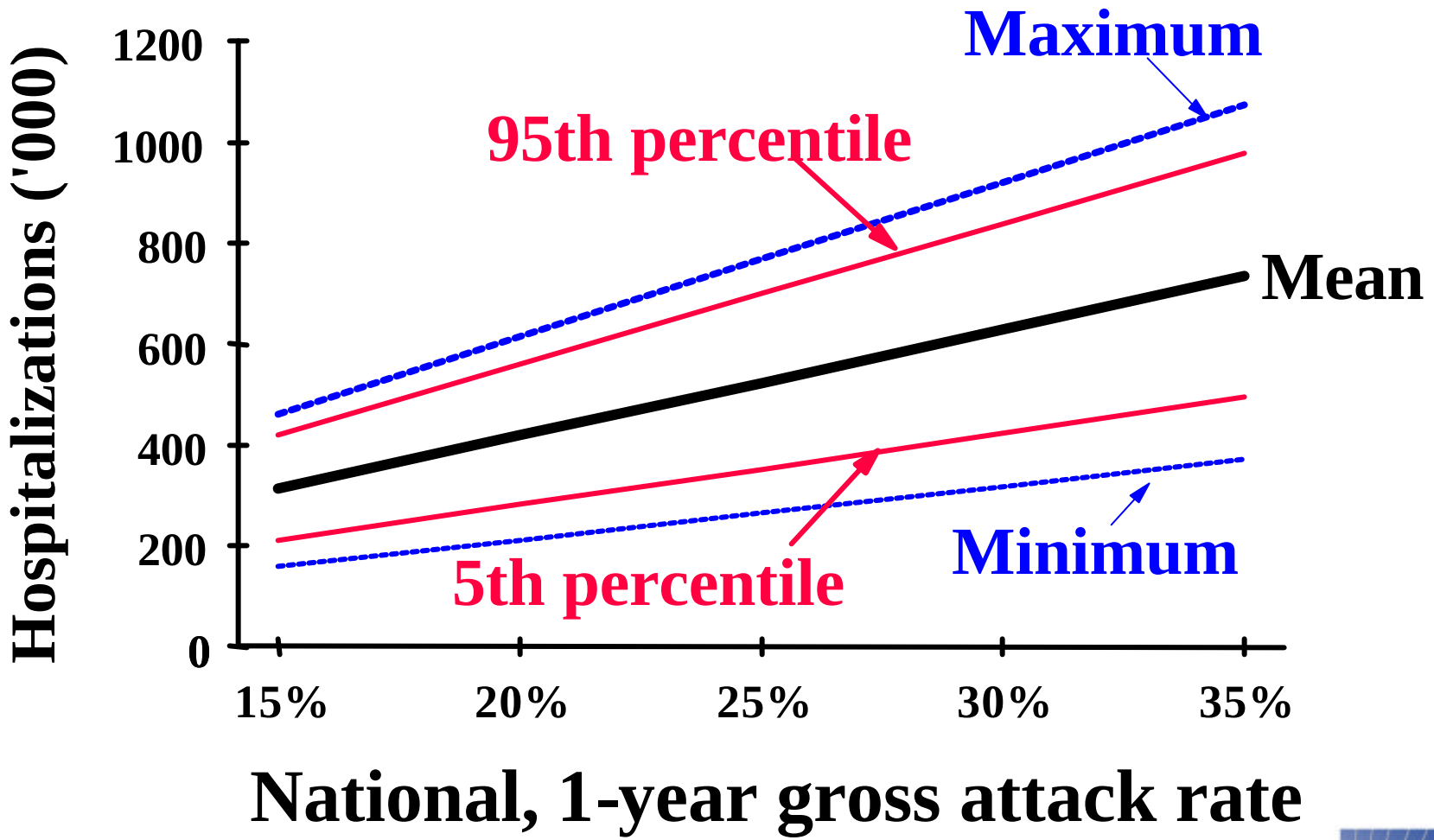
Estimated hospitalizations due to 'flu pandemic



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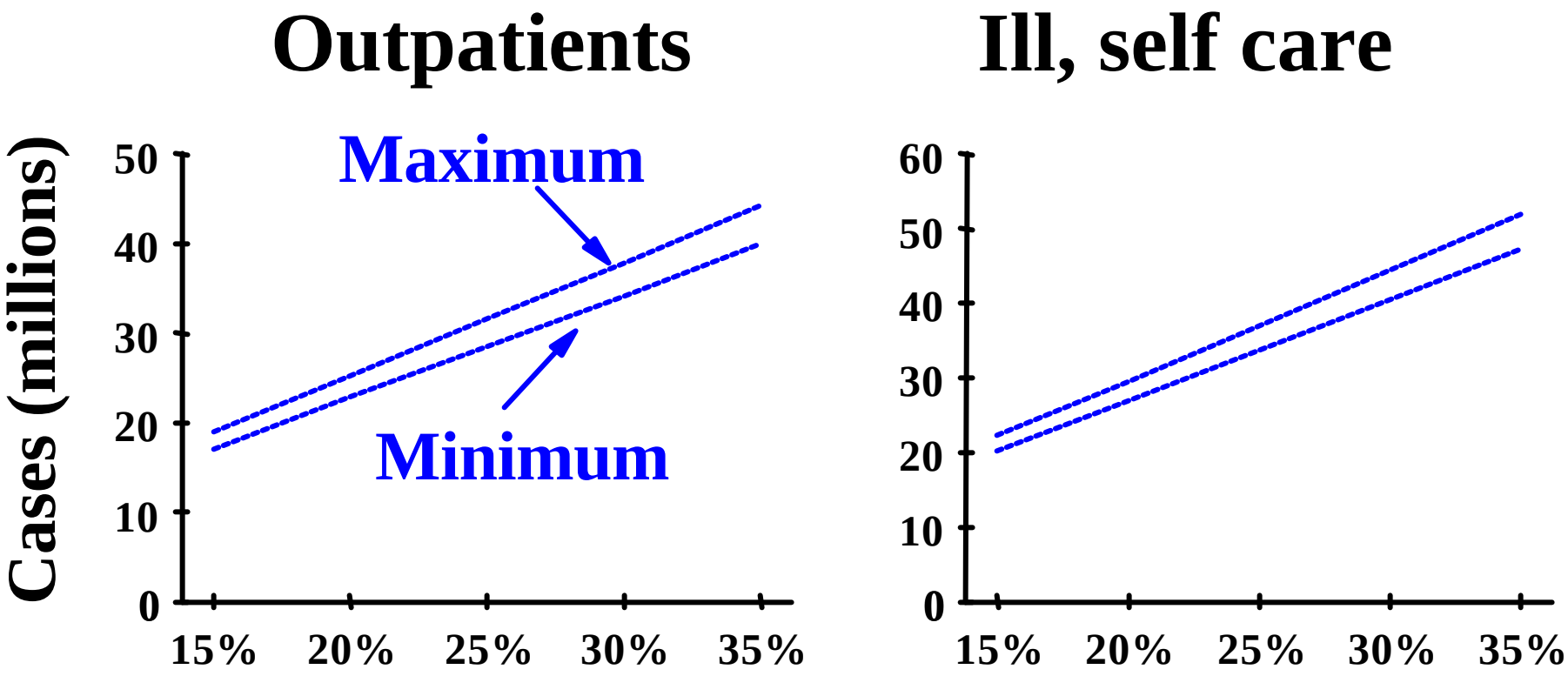
Number of outpatients and ill, self care



Total costs: 'Flu pandemic in U.S.

	Gross attack rate	
	15%	35%
	(US$ millions)	
Death		
Mean	**59,288**	**138,340**
5th percent	23,800	55,532
95th percent	94,907	221,451
Grand Totals		
Mean	**71,346**	**166,474**
5th percent	35,405	82,611
95th percent	106,988	249,638

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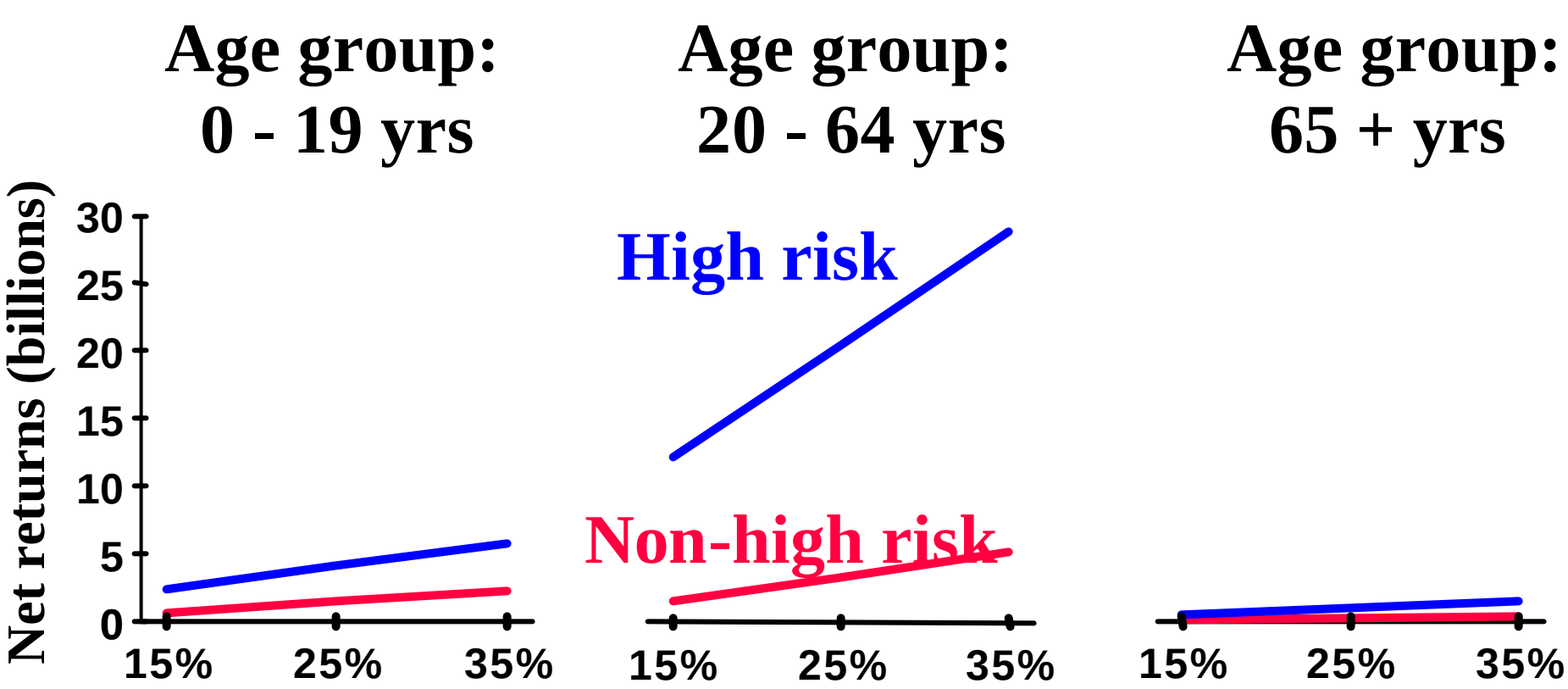
Net returns to vaccination: Age & risk group

$21/vaccinee; 40% compliance



Gross attack rate for entire U.S. population

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Policy implications: Who to vaccinate first

	Criteria for prioritization	
Priority	Risk of death	$ to vaccination
1 (top)	H.R. 65+ yrs	H.R. 20-64 yrs
2	non-H.R. 65+ yrs	H.R. 0-19 yrs
3	H.R. 0-19 yrs	non-H.R. 20-64 yrs
4	H.R. 20-64 yrs	non-H.R. 0-19 yrs
5	non-H.R. 20-64 yrs	H.R. 65+ yrs
6	non-H.R. 0-19 yrs	non-H.R. 65+ yrs

H.R. = high risk

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Conclusions

- Pandemic - cause considerable impact
- Great deal of uncertainty
  - Who, what, when
- "High risk" - disproportionate burden
- Possible that $\geq$ 50% of deaths in < 65 yrs
- Greatest economic burden due to death
- Therefore - intervene to save lives

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Conclusions

- Most scenarios +ve $ to vaccination,
  - BUT, some scenarios had -ve 5th
- Priorities for vaccination - criteria?
- Annual premiums - a definite must
  - Pay for the 3 P's
  - Exact uses of such funds to be debated

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The most ignored aspect

- Probability of event occurring
  - e.g: 100 year hurricane
- Events of different size = different probabilities
- Small events >> large events
  - Impact how much you pay to prepare

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Additional information

- **Paper: Meltzer et al.** **Emerg Infect Dis, 1999;5:659-671.**
- **Free copy:**
  http://www.cdc.gov/ncidod/eid/vol5no5/meltzer.htm
- **Additional information**
  http://www.cdc.gov/od/nvpo/pandemics/
- **Free software (next slide)**

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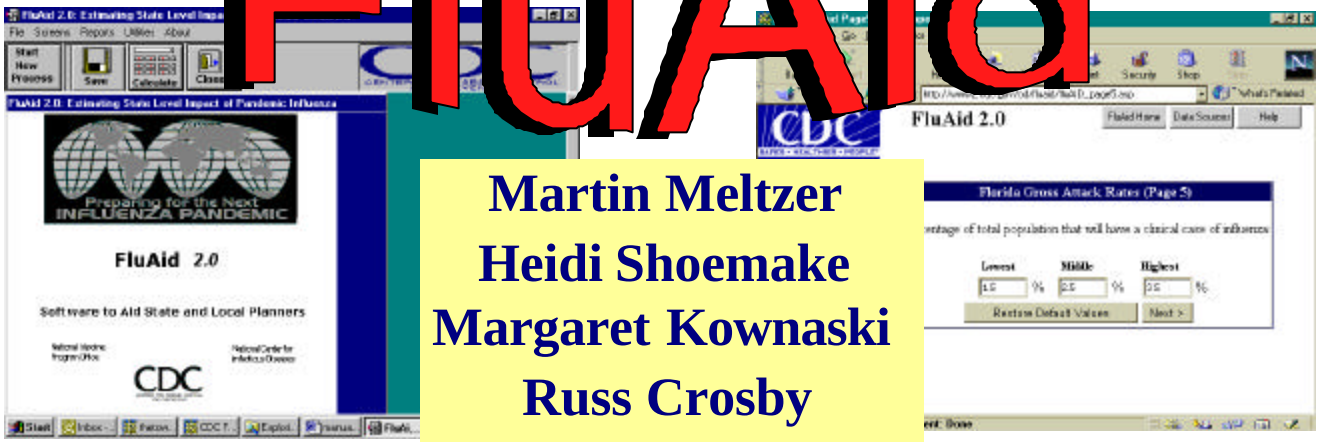
Additional Resources: Free Software!

Helping state and local public health officials prepare for the next influenza pandemic

FluAid



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Resource:FluAid 2.0

Software for estimating impact

- Goal: State-level estimates of impact
  - suitable for planning
- Goal: Easy to use - interactive
- Goal: Can run different scenarios

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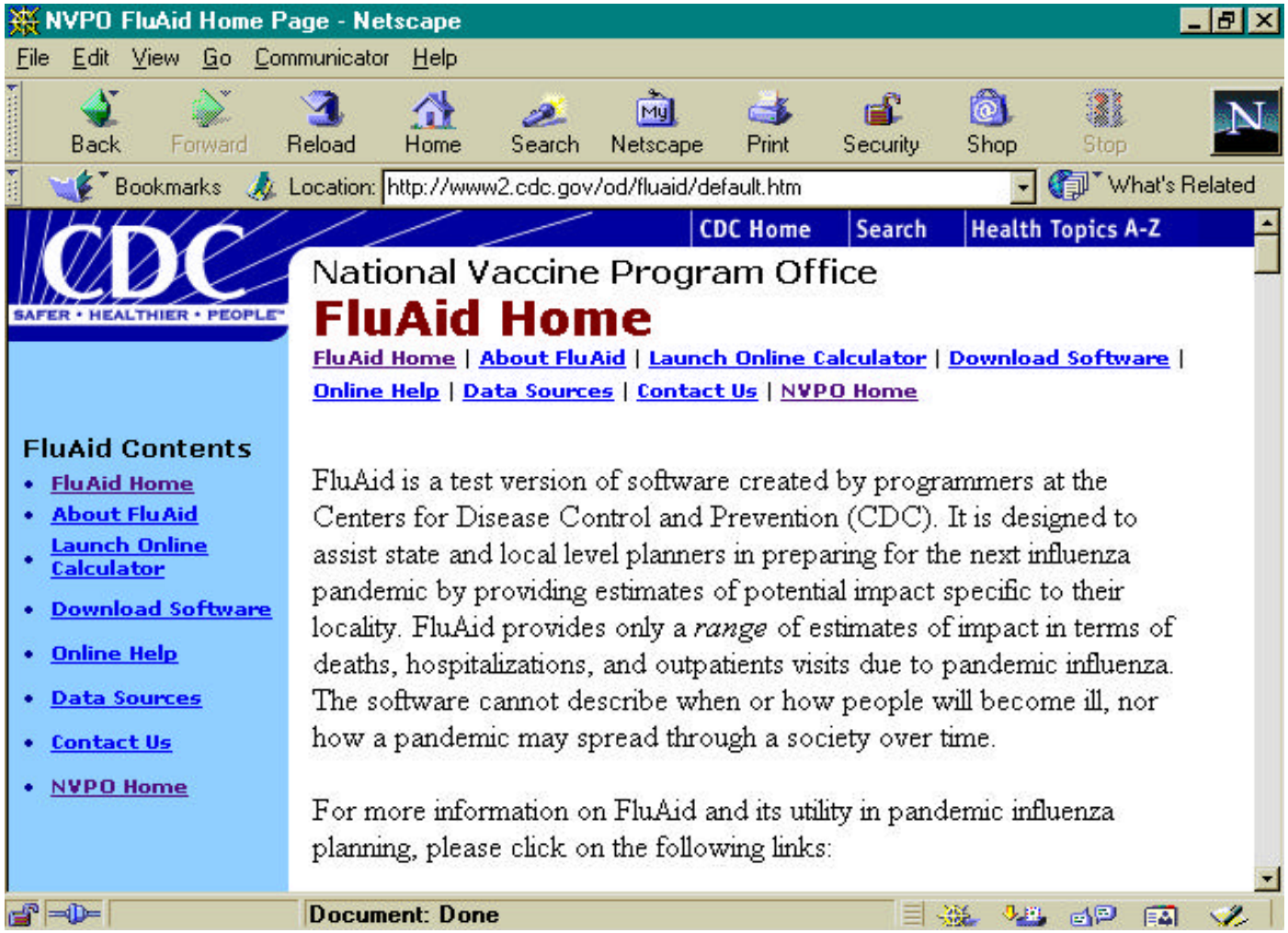
How access?



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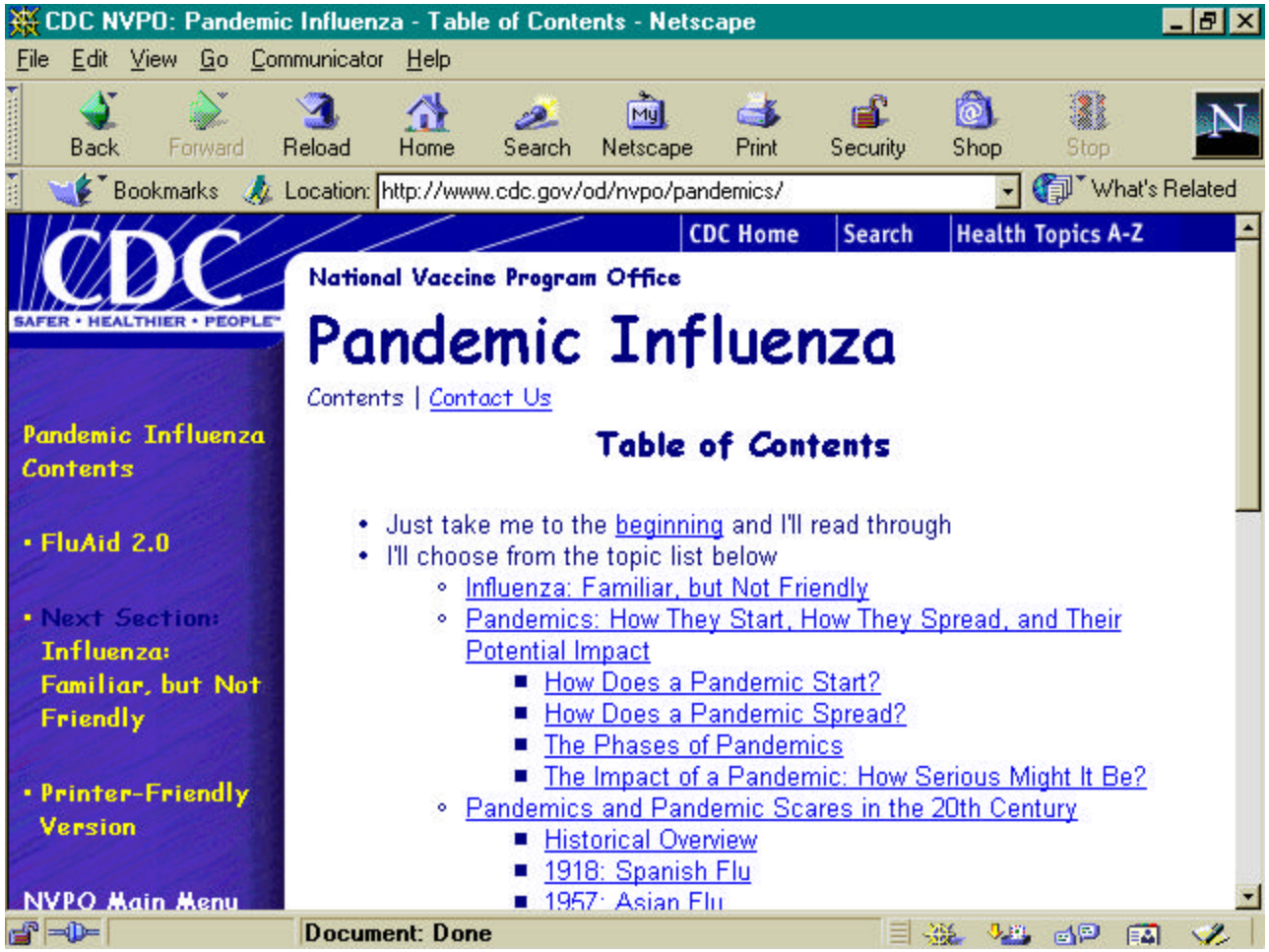
FluAid URL



www.cdc.gov/od/nvpo/pandemics
Click on: FluAid 2.0

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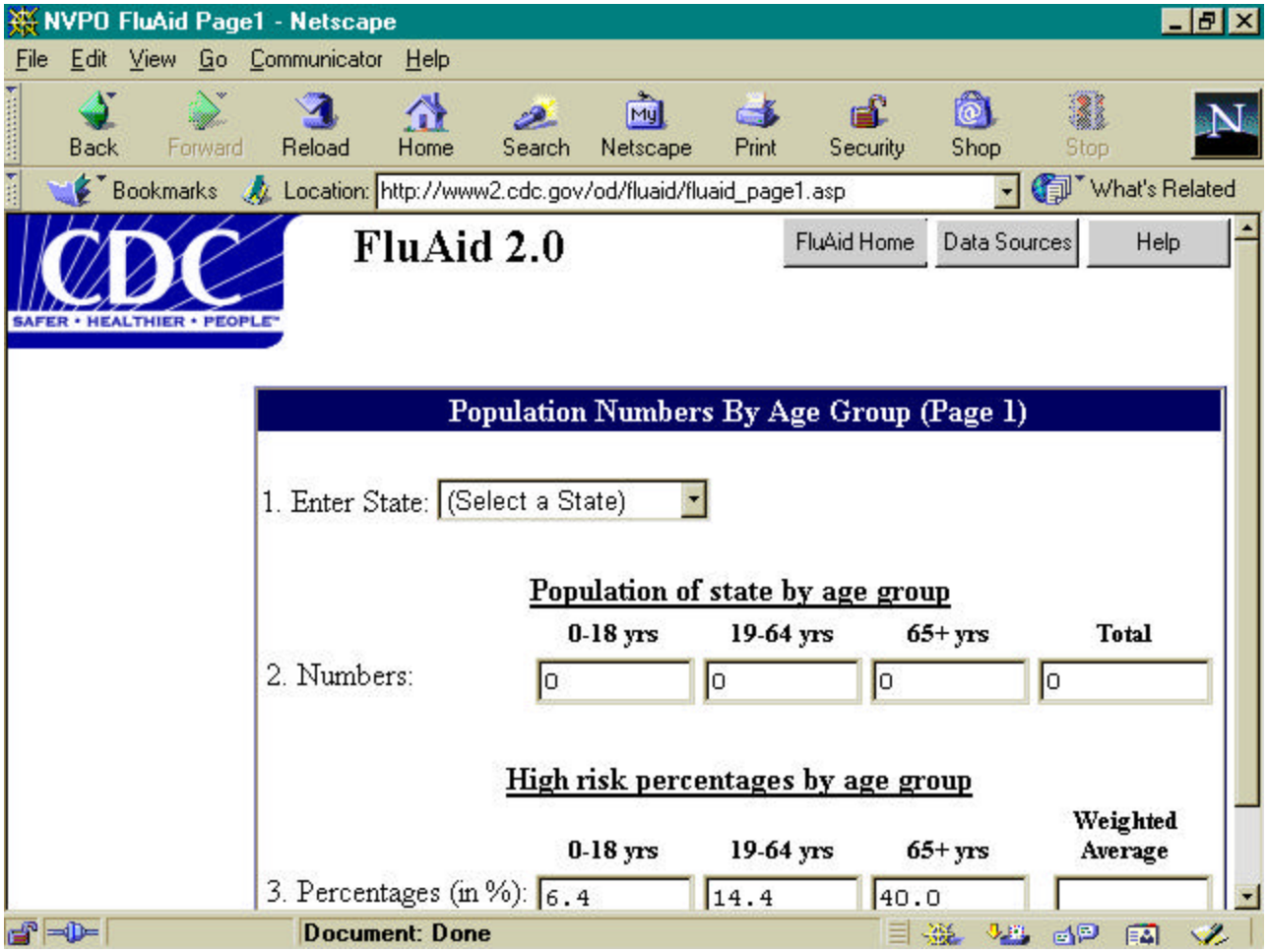
Choice 1:

Online calculator



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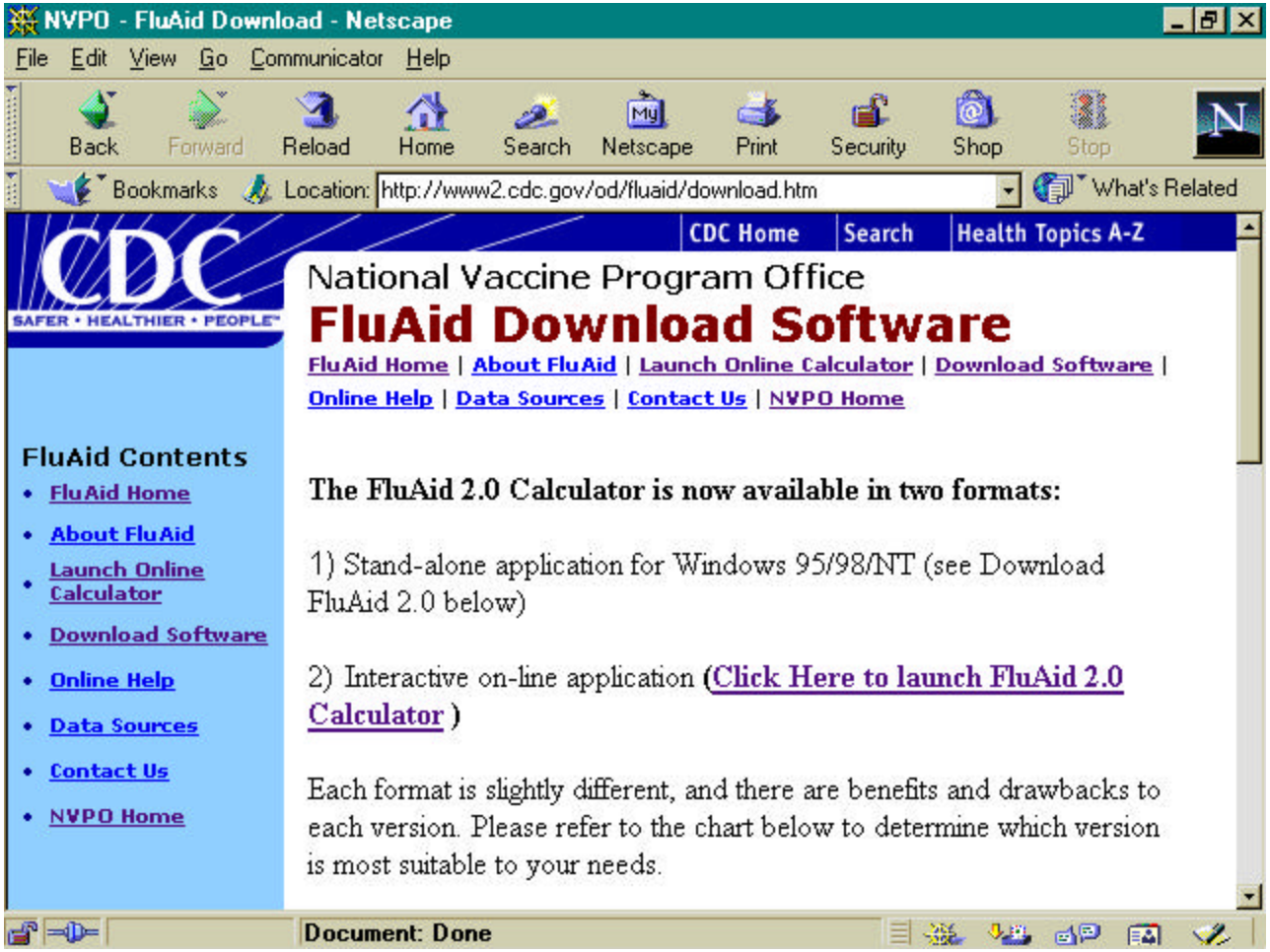
Choice 2:

Download



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